

REMARKS

Claims 13-27, 34-47, and 50-52 will be pending upon entry of the present amendment.

Applicants thank the Examiner for indicating the allowability of claims 13-27 and 34-46.

The Examiner has rejected claims 47 and 50-52 under 35 U.S.C. § 103(a) as being unpatentable over Shaw et al. (U.S. Patent No. 5,847,454, hereafter *Shaw*) in view of Dhuler et al. (U.S. Patent No. 6,410,361, hereafter *Dhuler*) and Chong et al. (6,180,536, hereafter *Chong*). Applicants respectfully traverse this rejection.

The standard that must be met to support a rejection under 35 U.S.C. § 103 is outlined in the MPEP at § 706.02(j):

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The MPEP provides further direction with regard to showing a suggestion to modify or combine references, in § 2143.01, of which subsections V and VI are excerpted below:

If [a] proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.

If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious.

Claim 47 recites, in part, “a circuit configured to detect electrical contact between the second portion of the beam and the first conducting layer.” None of Shaw, Dhuler, nor Chong teach or suggest this limitation, so a combination of these references cannot teach or suggest such.

The Office Action acknowledges that “Shaw et al. fail to disclose the required detection configuration and the required relationship between the beam and the wall of the trench.” (see item 3, second paragraph, of the Office Action), but states that “Dhuler et al disclose methods for fabricating in-plane MEMS thermal actuators wherein Fig. 5E the required detection configuration is disclosed.” However, neither Dhuler’s Figure 5E, nor any other of Dhuler’s figures or text shows “a circuit configured to detect electrical contact ...,” as recited in claim 47. Instead, Dhuler’s Figures 5A-5G illustrate steps in a manufacturing process. With regard to Figure 5E, Dhuler states:

Referring to FIG. 5E, shown is the thermal actuator construct after exposed silicon surfaces have been subjected to a conventional diffusion doping process. The doping process provides for a continuous conductive path along the periphery of the composite beam and defines the contacts on the anchor.

Dhuler, column 9, line 66 to column 10, line 4.

The contacts referred to in the quoted passage serve as connection points, located at the end of the beam that is anchored to the substrate, for an energy source that provides a current in the conductive path to heat the beam, causing it to deflect (see column 5, lines 15-22). Dhuler is entirely silent with regard to a circuit configured to detect electrical contact, as recited in claim 47, nor is there any structure provided with which the beam could make contact. Instead, Dhuler teaches away from permitting contact between the beam and the substrate by providing a trench underneath the beam to prevent such contact, and stating that, “[w]ithout a trench in place, there is a likelihood that depositing the metallic second layer will lead to electrical shorting of the underlying microelectronic substrate and any metal elements defined on the substrate” (column 5, lines 43-46).

For its part, Chong is directed to a microfabrication process for making, on a semiconductor substrate, enclosed structures such as microfluidic tunnels, cavities, channels and similar structures (see column 1, lines 15-24). The Office Action states that Chong discloses the “required relationship between the beam and the wall of the trench.” Applicants disagree. Applicants do not believe that Chong discloses the structure of the beam and trench as recited in claim 47. More to the point, Chong does not provide any teaching or showing of the elements absent from Shaw and Dhuler with regard to the circuit recited in claim 47. Accordingly, even if Chong were added to Shaw and Dhuler, there is no teaching of “a circuit configured to detect

electrical contact between the second portion of the beam and the first conducting layer,” as recited in claim 47. It is therefore not necessary to distinguish the structure of Chong’s beam and trench, as compared to claim 47.

Furthermore, even it could be shown that Dhuler or Chong taught or suggested the elements missing from Shaw, the cited combination would still fail to sustain a *prima facie* case of obviousness because such a combination is not appropriate under current case law. As the passages quoted above from the MPEP explain, a combination that renders the prior art invention unsatisfactory for its intended purpose, or changes its principle of operation, is not sufficient to render the claim *prima facie* obvious. In the present case, Shaw is directed to a device that employs capacitive coupling for its operation (see *Shaw*, column 14, lines 6-22). Such a structure relies on the capacitor formed by the “close proximity” of two conductive plates. As the distance between the plates changes, so too does the capacitance. Accordingly, a circuit configured to measure the variation in capacitance can be used to detect movement of a beam, and also the degree of movement. However, a capacitor requires a dielectric between its conductive plates (an air-gap dielectric, in the case of Shaw). If Shaw’s capacitively coupled beam were to actually make contact with the side wall, the capacitor would short out, which, at the very least, would cause the associated circuit to malfunction; at the worst, it would destroy the circuit, thus rendering it unsatisfactory for its intended purpose. On the other hand, if Shaw were modified to include a circuit “configured to detect electrical contact between the second portion of the beam and the first conducting layer,” this would change Shaw’s principle of operation, from a capacitive system to a system relying on physical contact for operation. Thus, Shaw would either be rendered unsatisfactory for its intended purpose, or would operate under a different principle of operation. In either event, there is no motivation to combine Shaw with any reference that would be sufficient to remedy Shaw’s deficiencies with regard to claim 47.

For at least the reasons outlined above, a combination of Shaw, Dhuler, and Chong cannot support a *prima facie* case of obviousness against claim 47, which is therefore allowable.

Claim 50 recites, in part, “means for detecting contact between the second portion of the beam and a wall of the trench.” A combination of Shaw, Dhuler, and Chong fails to teach or suggest this limitation of claim 50. The Examiner has acknowledged that Shaw does not

provide such a teaching, and neither Dhuler nor Chong can remedy the deficiency. Dhuler does not offer a teaching or suggestion of any means for detecting a contact between a portion of a beam and a wall of a trench. Dhuler's device is not formed in a trench, but on a surface of a substrate (see Figures 1A, 2, and 5A-5G). There is no equivalent structure provided with which the beam might make contact, and the device would not detect the contact if there were. Where Chong teaches any coupling between a beam and a wall, it is by conventional capacitive coupling, in a manner similar to that taught by Shaw (see Chong's column 10, lines 52-58).

Clearly, none of Shaw, Dhuler, nor Chong teach or suggest the recited limitation of claim 50. Accordingly, claim 50 is allowable over the art of record, together with dependent claims 51 and 52.

In light of the above remarks, Applicants respectfully submit that all pending claims are allowable. Applicants, therefore, respectfully request that the Examiner reconsider this application and timely allow all pending claims. The Examiner is encouraged to contact Mr. Bennett by telephone at (206) 694-4848 to discuss the above and any other distinctions between the claims and the applied references, if desired. If the Examiner notes any informalities in the claims, he is encouraged to contact Mr. Bennett by telephone to expeditiously correct such informalities.

Respectfully submitted,

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